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MONTANA AGRICULTURAL COLLEGE
EXPERIMENT STATION

F. B. LINFIELD, Director

BULLETIN NO. 102

Twelfth Annual Report
of the State Entomologist of
Montana



The Alfalfa Looper, *Autographa gamma californica* Speyer

BY
R. A. COOLEY

BOZEMAN, MONTANA
December, 1914

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THE MONTANA EXPERIMENT STATION,
 Bozeman, Montana.



Twelfth Annual Report of the State Entomologist of Montana

INSECT PESTS OF 1914

During the season of 1914, particularly the early summer months, insect pests were unusually abundant. The outstanding feature of the year was an unprecedented outbreak of the alfalfa looper (*Autographa gamma californica* Speyer) in nearly every section of the State. Other insects unusually abundant were flea beetles, cutworms, and the cosmopolitan butterfly.

Following our custom of the last few years a record is here made of the insects of economic importance which were particularly brought to our attention during the year.

ACARINA

Leaf Blister Mite (*Eriophyes pyri* Pgst.). In the Bitter Root Valley horticultural inspectors report the leaf blister mite as one of the worst fruit pests of the year.

Plum Gall Mite (*Eriophyes padi* Nal.). As usual plum leaves distorted by the attacks of these tiny mites were sent in several times from eastern Montana. Spraying experiments for controlling plum diseases, carried on by the station botanists, incidentally demonstrated that the plum gall mite can be controlled by a thorough dormant spraying with lime-sulphur.

ORTHOPTERA

Grasshoppers (*Acerididae*). Reports of grasshopper injury were fewer than for several years. Several persons from Cascade County reported losses due to grasshoppers, especially in alfalfa grown for seed.

THYSANOPTERA

Currant Thrips (*Liothrips montanus* Hood). For several years the work of this insect has been noticed in the currant patch at the college. The species proved to be new and recently has been described by Mr. Hood.

HEMIPTERA

A Predacious Nabid Bug (*Reduviolus ferox* Linn.). This ben-

eficial bug was observed in several instances to feed upon the fall migrants of the sugar-beet root-louse (*Pemphigus betae* Doane).

Leaf Hopper (*Oncometopia lateralis*). A report of unusual injury by Jassids was received from Flathead County, where corn and potatoes were seriously injured. The insects were said to cluster about the stem of the potato, causing it to bleed so as to wet the soil beneath the plant.

Green Apple Aphis (*Aphis pomi* DeG.). This has been abundant in all apple-growing sections of the State but not as prevalent as in 1913.

Cabbage Aphis (*Aphis brassicae* Linn.). This has been very abundant during the past season. A short article on its control was sent to many of the papers in the State.

Sugar-beet Root-louse (*Pemphigus betae* Doane). Control measures for this pest were experimented upon as an Adams project. Irrigating so as to keep the soil continually moist not only greatly reduces the number of lice but increases both the tonnage and sugar content.

Bedbug (*Cimex lectularius* Linn.). Several requests were received for information on the control of this household pest. A severe infestation in Bozeman was controlled by two fumigations with hydrocyanic-acid gas.

LEPIDOPTERA

Sugar-beet Webworm (*Loxostege sticticalis* Linn.). Although enormous numbers of moths appeared throughout the sugar-beet-growing districts in June, comparatively few worms developed and the injury was considerably less than for several years.

Cutworms (*Noctuidae*). Numerous complaints about cutworms were received from various sections of the State. Eastern Montana suffered most because of an invasion of the army cutworm (*Choriza grotis agrestis* Grote). In several instances entire fields of grain and flax were destroyed.

Imported Cabbage Worm (*Pieris rapae* Linn.). In the Gallatin Valley cabbage worms were the most abundant in years, and many letters were received concerning them from other parts of the State. An article on their control was sent to many of the newspapers in the State.

Canker Worm (*Alsophila pometaria* Harris). This pest again did some injury in Carbon County and apparently is spreading. An article dealing with its life history and control was prepared and was published in the principal newspapers of the county.

Clothes Moth (*Tinea pellionella* Linn.). Clothes moths were reported injurious in several localities. A particularly bad infestation was discovered in stored wool samples in one of the college buildings. Larvae were found in abundance and at work in February, although it is often stated that in northern states they are not active during the winter months. The wool was saved by a thorough fumigation with hydrocyanic-acid gas.

Alfalfa Looper (*Autographa gamma californica* Speyer). This was the most abundant and the most distinctive pest of the year.

Polyphemus Moth (*Telea polyphemus* Cramer). This beautiful and showy moth was reared from a cocoon collected at Osborn. The moth is new to our State collection.

Glover's Moth (*Samia gloveri* Strecker). The larvae were very abundant at Osborn, feeding upon box elder, elm, willow, etc.

DIPTERA

Lip Bot-Fly (*Gastrophilus haemorrhoidalis* Linn.). Apparently this species is gradually working its way westward. Several years ago it was common only in the vicinity of Glendive but it is now known to occur as far west as Billings.

Black Flies or Buffalo Gnats (*Simuliidae*). *Simulium vittatus* Zetterstedt was taken upon windows in the college horse barn. The bodies were filled with blood and the flies were quite sluggish. Undetermined species were taken upon horses in the Gallatin Mountains and in the Yellowstone Valley where they were reported to be so numerous that field workers found it necessary to wear veils.

Fungus Gnats (*Sciara* sp.). A quantity of maggots determined as belonging to this genus were sent in with the statement that they were extremely injurious to the roots of potted plants.

Onion Maggot (*Pegomya ceparium* Bouche). This was reported from Silver Bow, Ravalli, Gallatin, and Chouteau Counties. In Bozeman it was not as injurious as in 1913, even in ground where onions had been attacked the previous season.

Smoky Crane Fly (*Tipula angustipennis*). Adults were observed in great abundance during April and May in Gallatin, Carbon, Yellowstone, Cascade, and Fergus Counties.

Currant Fruit Fly (*Epochra canadensis* Loew.). This species continues to severely injure currants. Experiments were conducted with a poisoned bait but while the injury was considerably lessened, complete control was by no means obtained.

Mosquitoes (*Culicidae*). Several requests were received for aid in mosquito campaigns but no help other than advice could be given as no funds for such work were available. Mosquitoes were collected from many parts of the State and many valuable notes were made on their life history.

COLEOPTERA

Currant Fruit Weevil (*Pseudanthrenus validus* Dietz). The study of this little known currant pest was continued from the previous year. Data were gathered which indicate that it is probably two-brooded. A brief account of the life history and habits was read before the Atlanta meeting of the American Association of Economic Entomologists and was published in the Journal of Economic Entomology.

Wireworms (*Elateridae*). Many complaints of wireworm injury have been received from all sections of the State. In Fergus County a large acreage of winter wheat presented a condition which for want of a better name was called "yellow wheat." Fields were badly spotted with yellow patches of wheat, the heads of which never filled. In some cases wireworms were found upon the roots of affected plants but a fungus was also present and it is therefore difficult to name the direct cause of the yellowing. Wireworms were also found injuring corn and potatoes. Larvae have been collected at every opportunity and have been sent to Mr. J. A. Hyslop, who is an expert in this group. His determinations will give us valuable records on our species which are of economic importance.

Herbarium Pest (*Ptinus fur* Linn.). Many of the mounted specimens in the herbarium were badly injured by the small white larvae of this beetle. Flower heads were reduced to fragments and in some instances holes were eaten through the paper upon which the specimens were mounted.

Bumble Flower Beetle (*Euphoria inda* Linn.). In passing through a field of dent corn in the Yellowstone Valley it was noticed that many of the ears were open at the tip and that the kernels had been eaten into. One of the first ears examined contained four beetles of this species. They had worked their way beneath the husk at the tip and were busily eating the soft kernels.

SPOTTED FEVER TICK

This office has given much attention to the spotted fever tick during the past six years. A thorough investigation of its life history and habits has been under way, and much important information bearing on methods and means of destroying the tick has been secured.

During the biennial period now closing the work has been enlarged and is now being pushed with greater energy than before. The last legislature passed a bill creating the Montana State Board of Entomology. By the provisions of this law the secretary of the State Board of Health, the State veterinary surgeon and the State entomologist are made to constitute this board and directed to investigate and control insects which transmit human and animal diseases. An appropriation of \$5,000 was made, and authority given to prescribe rules and regulations for the control of such insects.

Through the efforts of Senator Myers an appropriation was secured for the Bureau of Entomology of the U. S. Department of Agriculture, for the purpose of undertaking the eradication of this tick, and upon the invitation of the secretary of the State Board of Health the U. S. Public Health Service also came into the work with a fund. These two Federal services have been working on the spotted fever tick in the Bitter Root Valley in cooperation with the Montana State Board of Entomology.

The complete change in the plans and organization of this work has in some measure relieved the State entomologist from participation in the actual work on the tick but at the same time has placed on him a new responsibility in the office of secretary of the Board of Entomology, which the law prescribes that the State entomologist shall fill.

A detailed report of the activities of this board is made in a separate publication, which will appear as the First Biennial Report of the Montana State Board of Entomology.

THE ALFALFA WEEVIL

The alfalfa weevil, to which attention has been called in previous reports, continues to spread in neighboring states to the south and is still causing serious and extensive damage to the alfalfa crop. So far as we know this pest is not yet present in Montana.

The State entomologist and the State horticulturist, M. L. Dean, have cooperated in making every effort to prevent the introduction of this insect across our boundary. A careful field study was made in Utah in order to determine what points should be guarded and what provision should be made to reduce to a minimum the chances for the insect to be brought into Montana in connection with shipments of produce.

Our investigations led to the establishment of a quarantine as stated in the Eleventh Report, and this quarantine is still in force. That it was necessary was clearly shown by the fact that shortly before it went into effect an assistant found living weevils rather plentiful in four carloads of potatoes arriving in Butte from Utah. We believe it is certain that the quarantine has already prevented large numbers of the insects from coming into the State.

In many instances reports have reached this office that the alfalfa weevil had been found in the State. These have all been looked up and in every instance it has been found that some other insect was the cause of the scare. Until this weevil has been present in a field for several years it does not produce any very noticeable effect, and its first appearance is not likely to be detected by any one but an entomologist.

The work on the alfalfa weevil has cost the State but a few hundred dollars—a sum far out of proportion to the benefits received if the insect has been delayed in its entrance into Montana even for one year.

MOSQUITOES

During the summer of 1914 there was a marked increase in interest in mosquito control in Montana. Knowing that mosquitoes are exceedingly abundant and troublesome in some localities in the State, it is surprising that there has not been before now a general movement for control. This movement started with

much energy this year. One town had raised a fund before communicating with me, and the first information we had was in the form of a request for a man to direct their work. We were forced to reply that we had no funds and no man available for this work. Several other localities made similar requests.

So far as possible without interfering with other work a study of mosquitoes was started. In connection with trips for other purposes some attention was given to this subject in three principal valleys of Montana, where these insects were particularly annoying. From the information at hand it is evident that there are localities where mosquitoes are so very abundant that it is quite out of the question to venture in for tilling the soil or for other purposes without having the face, neck, and hands completely protected. In some places the situation is so bad that stock is injured and farming operations are seriously held back.

In two valleys of the State, malarial mosquitoes were found, making a total of three localities in Montana where these insects have been found. This is a matter of interest, though it is not certain that we are in much danger of having this disease in these localities. The possibility is at least suggested.

Without further information regarding mosquitoes, we cannot lay out a reliable program of control. It is most desirable that attention be given to this matter. With a small amount of money to devote to this study and to experiments an enormous amount of good might be done, and the information regarding the method of control would spread from one community to another.

FOUL BROOD OF BEES

In the Ninth Annual Report of the State Entomologist (1911) attention was called to the fact that the American foul brood disease of bees is present in Montana, having been found in an apiary near Joliet in Carbon County. This matter was again mentioned in the Tenth Report (1912), but the legislature has not yet taken action. During this time the disease has been rapidly spreading and has already become a serious menace to the bee industry in Montana. It has spread down the valley from Joliet, where it was first found, and is prevalent around Billings, and it has been found a hundred miles eastward and a considerable distance northward

from that city. There is now strong indication that it occurs in the Gallatin Valley as at least one apiary is seriously affected with what appears to be this disease.

The number of bees kept in Montana has been rapidly increasing in recent years. The State entomologist and successful beekeepers have pointed out that bees do well in this State, even in some of the higher valleys, and the news has spread until many have made a beginning and some have gone into the business on an extensive scale. The largest apiaries are in the Yellowstone Valley. One company in this valley has 1,500 stands of bees and last season harvested 90,000 pounds of strained honey and 15,000 pounds of comb honey.

So far as natural conditions are concerned there is no reason why Montana may not soon be producing enormous amounts of as good honey as is to be found anywhere and helping to supply the markets of the country instead of herself furnishing a market for other states.

The presence and rapid spread of the American foul brood disease threatens soon to destroy this bright prospect. The disease exists unrecognized in many apiaries and few who know they have it know how to get rid of it. From infected apiaries the disease is being spread accidentally to other bees, and some persons, we fear, are willfully or ignorantly selling infected bees.

LEGISLATION NEEDED

The Ninth Annual Report of the State Entomologist contained the following paragraph which will express exactly what the situation needs. I can do no better than repeat it:

"It is very clear that American foul brood will not be suitably controlled without laws which define and make mandatory correct methods of prevention and eradication. At least sixteen of the states have such laws at the present time and these provide for from one to fifteen inspectors in each state.

"The best laws of this kind provide not only for inspection, quarantine, and eradication, but also for instruction. This is in response to a very natural demand, for the majority of beekeepers are sadly in need of information in regard to apicultural methods and practices.

"It will be some years before apiary inspection work in Montana will require the full time of one man and yet the amount that

is needed is badly needed. It is fortunate that the kind of training and information needed for this work is so similar to general economic entomology that one of the regular force of this department of the agricultural college can do this work in connection with other regular duties as provided in the State Entomologist law of Montana.

"It is, therefore, proposed and recommended that in the near future the work of apiary inspection be regularly taken up by the State Entomologist's office and that legal authority be provided by the next Legislature."

IMPORTANCE OF THE BEE INDUSTRY TO MONTANA

No exact figures indicating the amount of honey produced in Montana are available. We have given above the figures for one company, and we know of other large apiaries and many small ones. Assuming that this company produces one-tenth of the honey grown in the State (and it probably does not), then Montana produces annually a crop of about 1,000,000 pounds, which at 15 cents a pound, certainly a low enough price, is worth \$150,000.

Montana grows an enormous acreage of alfalfa and alsike and white clovers, as well as many other honey-producing plants, thus offering a great opportunity for the bee industry. This disease is already doing serious harm, not only by killing the bees, but by discouraging the apiarist and generally blighting the business. It can be checked and controlled, if not eradicated, at a comparatively small expense to the State if the matter is taken up soon.

AN ASSISTANT NEEDED

The Montana State Entomologist law has been in operation for twelve years. During this time the Experiment Station entomologist has served, as provided by law, with no salary other than that received from the Agricultural College and Experiment Station. The fund has been gradually increased from \$300 to the present \$2,000, all of which is used in office and field expenses. It is to the State many times over in the saving of agricultural and horticultural produce from destruction by insect pests.

believed that the small sum annually expended has been returned

During these twelve years great changes have come about in Montana agriculture. The tillage area has been greatly increased, dry-land farming has come into prominence, the orchard industry

has been enlarged and improved, and there has been much general development and awakening. With this development has come a greatly increased demand for information from this office. The correspondence has become heavy and the problems arising from the advent of new or little known insects are multiplying. The demand has passed the limit of what the office can do without an assistant or a deputy State entomologist.

CORRESPONDENCE

Requests for information by letter are encouraged and have been rapidly increasing in recent years. These cover a wide range of entomological topics, including the control of pests of the farm, garden and orchard, parasites of domestic animals, greenhouse pests, pests of the household, blood-sucking insects attacking man, the spotted fever tick, insecticides, and spraying machinery. Correspondence regarding bee-keeping and the diseases of bees is also cared for in this office, as well as that regarding the control of ground squirrels and the rodent pests.

PUBLICATIONS

Under the provisions of the State entomologist law the annual reports of this office are published in the regular series of the Montana Experiment Station bulletins. It has been thought best that these reports should be kept executive and administrative, and that the information regarding insect pests and the means to be employed for their eradication or control should be published in timely bulletins and circulars of information from the Experiment Station. This policy was definitely established some ten years ago and has been adhered to. A number of valuable publications have been issued thus by the State entomologist or an assistant during the past biennial period. The following is a list of these publications:

Cabbage Worms and Cabbage Aphis.

Alfalfa Weevil.

Fungicides and Insecticides.

The Sugar-beet Webworm.

Eleventh Annual Report of State Entomologist.

In addition to these, newspaper articles have been written and

lectures have been given at farmers' meetings and before high schools.

SUMMARY OF DUTIES

The State entomologist, by virtue of his office, serves the State in several capacities. He is charged with the administration of the State's insecticide and fungicide law, which was enacted for the purpose of preventing the manufacture, sale, and transportation of adulterated insecticides and fungicides; he cooperates with the State horticulturist in carrying into effect the State's pest quarantine law; he serves as a member and the secretary of the State Board of Entomology, whose duty it is to investigate and control insects which carry diseases of man and domestic animals.

These are in addition to the activities of his central position as State entomologist, which are reported in this bulletin.

NEEDS AND PLANS

In the foregoing pages attention has been called to the need for a foul-brood law in order that protection may be given to the bee industry in Montana. If the legislature passes such a law it is intended that the actual work of inspection and instruction shall be done by one of the men in this office or by an assistant secured for a few months for this particular purpose. In this way the work can be done for a few hundred dollars.

No other expansion of the work of this office is contemplated during the next biennium.

The work of pest control has already grown to such proportions that it is impossible for me to longer handle it without the assistance of a man to act as deputy. It is therefore requested that a small increase be given to make this possible. It is planned that this assistant shall spend his time during the growing season out among the farmers, both getting and giving information. It is further intended that during the fall and winter months he shall work in cooperation with the farmers' institute office, lecturing and preparing newspaper articles and circulars.

ESTIMATED EXPENDITURES OF THE ENTOMOLOGIST
FOR THE TWO ENSUING FISCAL YEARS

	1915	1916
Salary of assistant.....	\$1200	\$1400
Expenses of assistant.....	1000	1000
Proposed inspection of apiaries.....	700	700
General expenses of the office.....	600	600
	<hr/>	<hr/>
	\$3500	\$3700

The appropriation for the fiscal year just closing was \$2,000.

